



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/SE85/00393 <b>(22) International Filing Date:</b> 14 October 1985 (14.10.85) <b>(31) Priority Application Number:</b> 8405140-8 <b>(32) Priority Date:</b> 15 October 1984 (15.10.84) <b>(33) Priority Country:</b> SE  <b>(71) Applicant (for all designated States except US):</b> UN-IGRAFIC AG [CH/CH]; Strehlgasse 33, CH-8001 Zürich (CH).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only) :</b> OLSSON, Sture [SE/SE]; Norra Traneredsvägen 17 A, S-421 77 Västra Frölunda (SE). AHLM, Roger [SE/SE]; Snickaregatan 6 A, S-582 26 Linköping (SE).  <b>(74) Agents:</b> STRÖM, Tore et al.; Ström & Gulliksson AB, P.O. Box 4188, S-203 13 Malmö (SE).		<b>(81) Designated States:</b> AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), NO, SE (European patent), SU, US.  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> DEVICE FOR MARKING EDGES OF SHELVES  <div style="text-align: center;"> </div> <b>(57) Abstract</b> <p>A device for indicating prices, article numbers or similar information on the edges of the shelves in department stores or storing premises. The device comprises a number of displays which shall be mounted to the shelves, and each display is connected to a separate electronic control unit and forms together with said unit an operative unit having its own power source. This operative unit is directly or indirectly connected to external control apparatus.</p>		

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## DEVICE FOR MARKING EDGES OF SHELVES

The invention relates to a device for marking edges of shelves, and more particularly to a device for  
5 indicating prices, article numbers, or similar information on the edges of the shelves in department stores and storing premises.

As the commercial marking of goods to an increasing extent is made by using the so-called bar code which can  
10 be read electronically and thus facilitates the registration of the purchased goods in the cash register, the common price tag on the goods will be superfluous from a commercial point of view and thus can be dispensed with if this is permitted by the  
15 authorities concerned. Then, the marking on the edges of the shelves will be much more important, and for such marking there are used today practically without exception signs which comprise a holder with manually interchangeable figures or other characters. Price  
20 changes in the goods assortment, which may occur every day to a great extent as far as everyday commodities are concerned, include an extensive manual work for the shop staff in changing the several signs which, moreover, are disadvantageous, because it is not difficult for a  
25 person to change unauthorizedly the information on a sign, if he wishes to do so.

However, according to the periodical Supermarket No. 7-8/84, page 25, an electronic marking for the edges of shelves has been proposed recently, which eliminates  
30 the drawbacks of the "manual" shelf edge marking. In that case a display having illuminated digital figures, is provided on the edge of the shelf and can be controlled from the shop computer such that a changed price will be shown immediately and without further  
35 manual steps by the display indicating the price of the

article for which the price has been changed. The electronic shelf edge marking also permits that there is initiated in a shop a price test or selectively applied price activities during specific selected business  
5 hours. However, the electronic shelf edge marking proposed according to said periodical would require for the operation thereof an extensive wiring not least for the power supply of the displays.

Also the device of the invention has been developed  
10 for electronic shelf edge marking and comprises a display mounted to the shelf, and a control unit operatively connected to the display.

In order to make possible that the displays are mounted at an arbitrary position, i.e. on the edges of  
15 shelves which are disposed along a wall, as well as on the edges of independent shelves (nacelles) without the necessity of an extensive wiring to the individual displays, and also in order to make possible that the displays are controlled, i.e. that the information  
20 disclosed by the displays is changed by selective calls from a shop computer or from a portable control device by the transmission of signals via a wireless connection between the displays and the shop computer or control device, respectively, each display having its own call  
25 code, the device of the invention has obtained the characteristics appearing from claim 1.

Each independent operative unit of the kind included into the device of the invention can easily be miniaturized by using integrated circuits as far as the  
30 control unit included therein is concerned and also can be made very economic as to the power consumption thereof such that the display can be dimensioned practically only with consideration of the desired size of the display, because the rest of the electronic  
35 equipment can be made very small. The absence of wiring

to the units means a great freedom when the units are to be located, which considerably facilitates the exposure of the goods assortment.

In order to explain the invention in more detail  
5 reference is made to the accompanying drawings in which  
FIG. 1 is a front view of a display which can form  
part of the device of the invention,  
FIG. 2 is a simple block diagram of the invention,  
FIG. 3 is a block diagram over one of the  
10 independent operative units forming part of the  
device,  
FIG. 4 is a circuit diagram over an IR receiver  
which can form part of the independent operative  
unit, and  
15 FIG. 5 is a block diagram over a portable control  
unit, a so-called "key", for operating the  
independent operative units.

In FIG. 1 there is shown an embodiment of a display  
10 which can be used in the device of the invention. It  
20 is of the type operating with liquid crystals (LCD) and  
it has a window 11 in which the desired information 12  
is shown. This display shall form part of an independent  
operative unit which includes also electronic equipment  
for controlling the information 12, i.e. for changing  
25 this information or replacing one piece of information  
by another one. In the preferred embodiment, this unit  
is controlled by wireless control from a control unit,  
and therefore it has a receiver 13 on the front side  
thereof. The display 10 shall be provided with suitable  
30 means for removably or permanently attaching said  
display on the edge of a shelf, but such means are not  
shown herein, because they can be constructed in a known  
manner and must be adapted to the shelves on which the  
display is to be mounted.

35 In FIG. 2 to which reference now is made, the

device of the invention is shown broadly as a generic block diagram. In this diagram, the display is shown again and due to the fact that the display has been located in a rectangle indicated by dot and dash lines 14, within which there is also a block 15, it has been indicated that the display and the block form together a unit which can be included entirely in the housing of the display. The block 15 represents an electronic control unit which is connected to the display for the control thereof, and this control unit is provided with the receiver 13 mentioned above. Signals are transmitted to the control circuit 15 via the receiver 13 from a circuit 16 for serial transmission via a transmitter 17, and a control device 18 is connected to the circuit 16, said device comprising principally a microcomputer and can be constructed as a portable unit, a so-called key, the appearance of which resembles a minicomputer or a remote control for TV sets. Alternatively, there can be connected to the circuit 16 a shop computer 19 which controls also existing cash registers. The circuit 16 with the transmitter 17 preferably is combined with the control device 18 to form a unit therewith. The circuit 16 can also be included in the shop computer 19 or it can also be connected with said computer via a cable.

It is possible to exclude the transmitter 17 and the receiver 13 and to connect all units 14 with the circuit 16 via cables, but this leads to a rather complicated and cumbersome arrangement of the displays. Instead it is preferred to arrange the operative connection between the control unit 15 and the circuit 16 as a wireless connection either as a radio connection or as an IR connection, said latter connection operating with infra-red light. In order to guarantee a safe connection between the control unit 15 and the several displays and the shop computer 19 it may be necessary to

connect several transmitters 17 to the circuit 16 via cables, said transmitters being located at different positions in the storing premises in order that the control units 15 of all displays can be reached via the wireless connection and no one thereof being located in a "shadow". Several circuits 16 then can be arranged in parallel, and these circuits can either be connected in parallel to the shop computer 19 or form part of a unit together with the control device 18. In that case several control devices can be provided for controlling the displays.

FIG. 3 discloses in more detail how the control unit 15 with the receiver 13 is constructed. The receiver 13 which is assumed to be an IR receiver and shall be described in more detail below, is connected to an amplifier and a decoder 20 the output signal of which is supplied to a serial shift register 21. To this register there is connected a 64 bits register 22 which is a price register, and a 64 bits register 23 which shall be termed a name register herein and serves the purpose of storing information which can be used for identifying the several displays by the article number or position number. Each of the registers 22 and 23 has a control circuit 24 and 25, respectively, which is connected to an output circuit 26. All registers and the output circuit 26 are connected to a microprocessor 27. The output circuit 26 forms an exciter for the display 10.

The control unit 15 can be made on a single chip according to CMOS technique so that it will be extremely small and above all will have a very low power consumption. As a consequence thereof it can easily be mounted inside the housing of the display 10 and it can be supplied from a power source which comprises a battery of the same type as is used in electronic

wrist-watches. Thus, it is the intention that each unit 14 shall be an independent operative unit provided with its own power source, which in case of wireless control requires no cable connection whatsoever with a power source or the control unit.

The circuit 16 comprises a gate with a pulse modulator and thus can be included in the shop computer 19. The circuit is used for single-way communication of data to the unit 14, and the data to be communicated or supplied to the circuit 16 from the key 18 or from the shop computer 19. The circuit can operate with pulse width modulation and shall transmit signals with a call code for the identification of a specific display and thus selective call thereof and signals containing information which shall be shown by the related display.

It is assumed that the display shows a price, 590.-, and that no signal is supplied from the transmitter 17 to the receiver 13. Then, the display shows a price of the article which is available on the shelf provided with the display, and this price is stored in the register 22. The control unit 15 is controlled from the unit 18 and/or 19 via the circuit 16 and the wireless link 13, 17, digital signals in the binary system being supplied from the unit 18 or 19 to the circuit 16 which converts these signals to a pulse width modulation. Via the link 13, 17 the pulse width modulated signal is transmitted to the control unit 15. In this unit, the pulse width modulated signal is decoded in the amplifier 20 in order to reproduce the original digital signal which is supplied to the shift register 21 wherein the signal is stored for future use. The microprocessor 27 ranges the incoming signals such that they are supplied to the price register 22 or the name register 23 and from these registers are supplied to the output circuit 26 via the control circuit 24 and



25, respectively. As mentioned, the actual price is stored in the price register 22, and in the same manner the article or position number is stored in the name register 23, said article or position number being  
5 unique for the related display and serves as the selective call of said display. The normal condition of the display is that the price is shown continuously, but if a predetermined signal is supplied from the unit 18 or 19, it can be achieved by means of the microprocessor  
10 27 that the article or position number stored in the register 23 instead is shown on the display 10, and if the microprocessor comprises a computer, the article or position number can be shown only for a certain period, the display then returns to show again the programmed  
15 price.

If a new price now is to be programmed on a specific display which represents a specific article or position number, a digital signal will be supplied from the unit 18 or 19, said signal representing article  
20 number and price. Then, the microprocessor 27 of all units 15 will effect a comparison between the article number stored in the register 23 and the article number decoded in the unit, and only in case of the related number being stored in the register 23, the  
25 microprocessor 27 will provide continued ranging of the incoming signals, the signal which represents the new price being stored in the register 22. From this register the signal is ranged to the display to be shown thereby. In a similar manner there can be obtained by  
30 supplying a signal from the unit 18 or 19 a change of the article or position number for a specific display by storing a specific number in the register 23.

Both the pulse width modulation and the register system of FIG. 3, controlled by the microprocesor, are  
35 previously known and therefore there would be no

difficulties for the man skilled in the art to build up the unit 15 for the function described. This unit accordingly will not be described in detail here. However, the circuit required for the reception of IR signals, which according to the invention is of a specific kind so as to have a minimum sensitivity to surrounding light, will be described in more detail with reference to FIG. 4.

The circuit shown in FIG. 4 includes a photodiode 28 for the reception of the transmitted IR signal and the conversion of this signal to an electric signal. The electric signal is transmitted via a condenser 29 forming a high pass filter for low frequency, to an amplifier 30 which in turn is connected via a condenser 31 to an amplifier 30' for adaption of the output level to the amplifier 20 arranged as a decoder. In order to remove background noise from the transmitted signal a specific circuit is provided which comprises an amplifier 32 connected via a resistor 33 to a field effect transistor 34, a condenser 35 being connected in parallel with said transistor.

In FIG. 5, a block diagram over the control device 18 is shown. This device comprises a keyboard 36 connected to an input and output gate (interface) 37. The keyboard is connected via the gate 37 to a microprocessor 38 having a RAM (operating memory) 39 and a ROM (program memory) 40. The microprocessor is connected over a data and address bus 41 to an input and output gate (interface) 42 to which is connected also an amplifier 43 which supplies an LED 44 for IR radiation. Also a display 45 for showing the signals supplied by the control device can be connected to the gate 42, and moreover this gate can be provided with a connection 46 for external input signals or for the supply of signals e.g. to a shop computer.

As is clear from the description above, it is possible in the device of the invention to operate a display by selective call either from the so-called key or from the shop computer. If the operation is effected by means of the key, this is directed towards the display to be operated such that an IR connection will be established between the key and the display. Then, the procedure described above is followed in order to show the article or position number or to change said number or price.

If a shop computer is connected to the device of the invention, an article register based on the shelves of the shop must first be established in the computer. Each shelf is assigned a specific position number which is then registered in the shop computer. When it is desired to change an article price, a question is put to the computer which rapidly searches for the location of the shelf and changes the price.

As far as the electronic construction of the device of the invention is concerned, there would be great possibilities of making this design according to other principles than indicated herein. It is also possible to use different types of displays, but a display of the type LCD is preferred due to the low power consumption thereof. Essential according to the invention is that a large portion of the electronic system can be made as an integrated circuit on a chip and can be located in a common housing together with the display for attachment to the edge of the shelf as an independent operative unit having its own power source.

## CLAIMS

1. Device for indicating prices, article numbers  
or similar information on the edges of the shelves in  
department stores and storing premises, comprising a  
5 display mounted to the shelf, and a control unit  
operatively connected to the display,  
c h a r a c t e r i z e d in that each display is  
connected to a separate electronic control unit and  
forms together with said unit a self-contained operative  
10 unit having its own power source, which can be connected  
directly or indirectly to external control apparatus.

2. Device as claimed in claim 1,  
c h a r a c t e r i z e d in that the control unit  
comprises a number register and a price register each  
15 having an associated control circuit connected to a  
drive stage for the display, and a serially operating  
shift register connected to the number of price  
registers, and a microprocessor for controlling the  
control unit.

20 3. Device as claimed in claim 1 or 2,  
c h a r a c t e r i z e d in that the display comprises  
a display of the LCD type.

4. Device as claimed in any of claims 1 to 3,  
c h a r a c t e r i z e d in that the control apparatus  
25 can be connected to the self-contained operative unit by  
means of a wireless link preferably of the IR type.

5. Device as claimed in claim 4,  
c h a r a c t e r i z e d in that the control apparatus  
is connected to a circuit for pulse width modulation of  
30 digital signals from the control apparatus, and that the  
self-contained operative unit comprises a circuit for  
decoding the pulse width modulation.

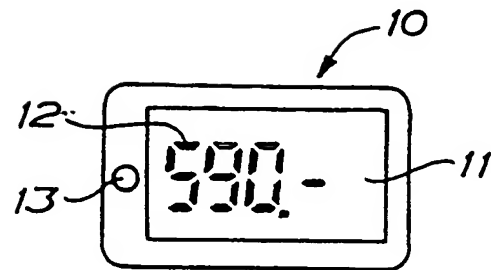


FIG. 1

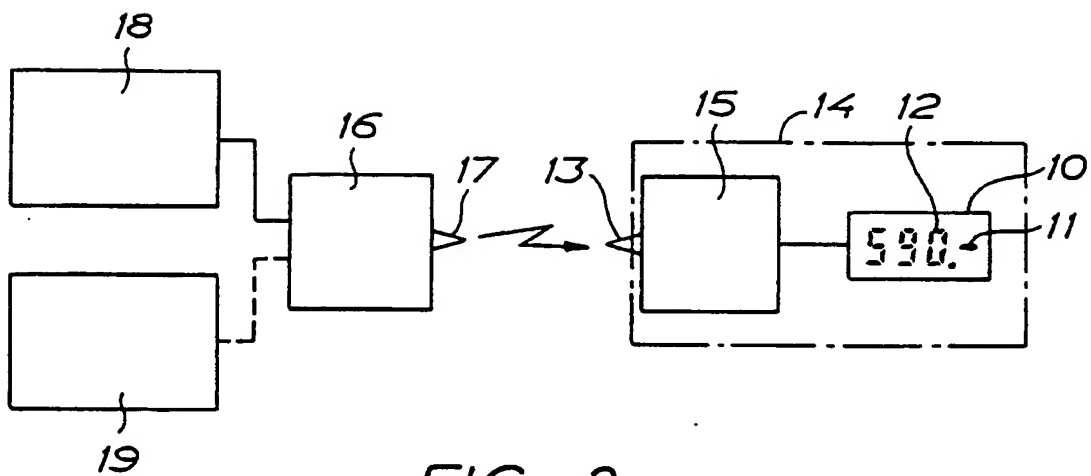


FIG. 2

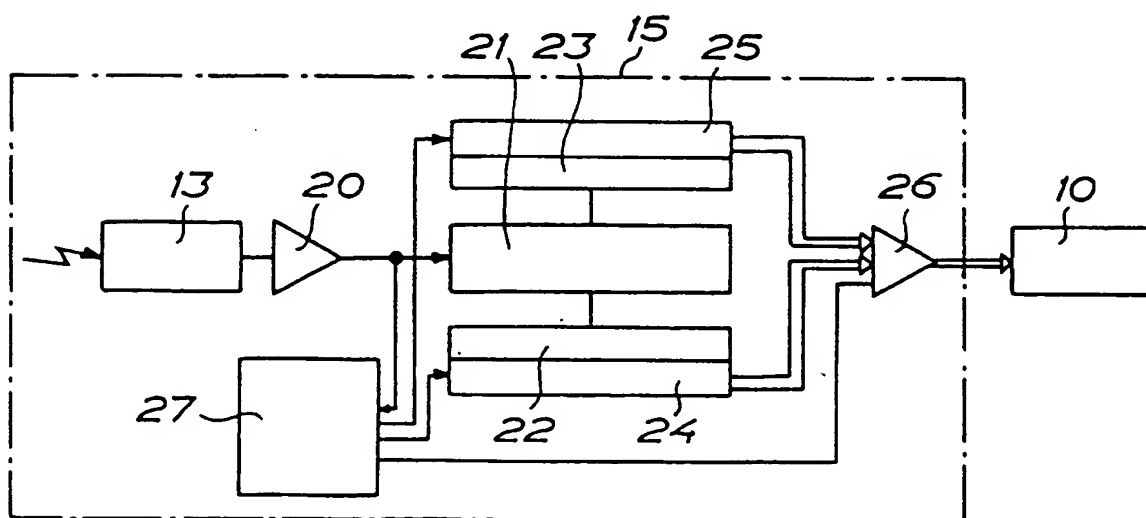


FIG. 3

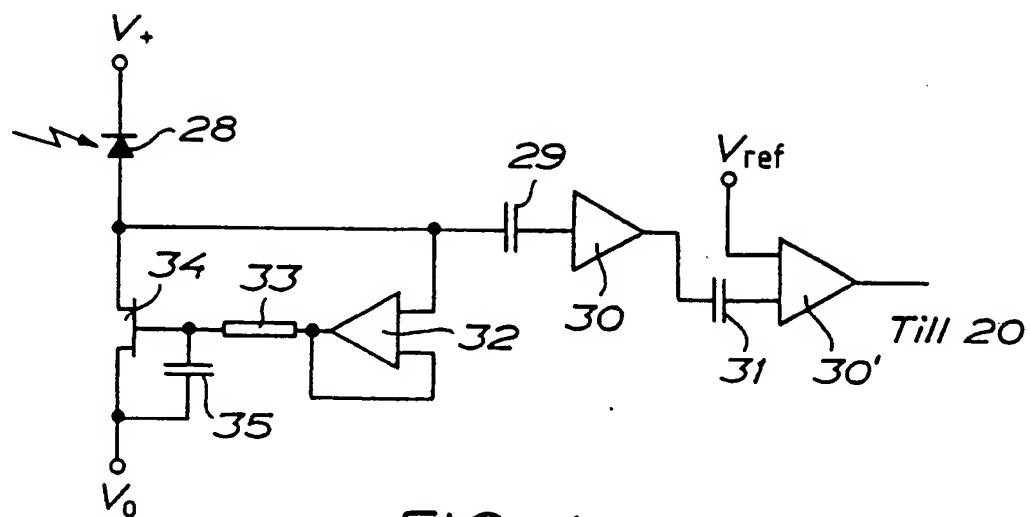


FIG. 4

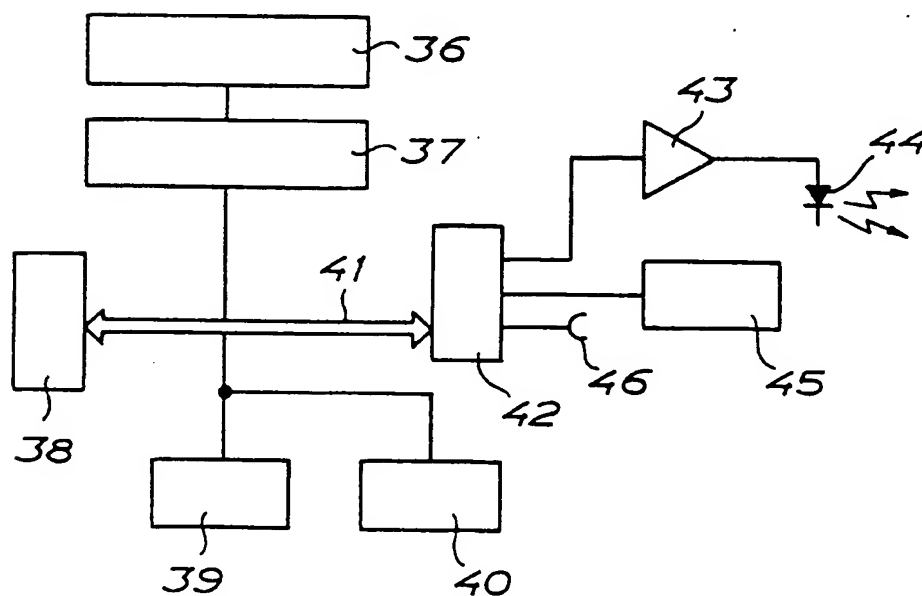





FIG. 5

# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE85/00393

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) * According to International Patent Classification (IPC) or to both National Classification and IPC 4 <p style="text-align: center; margin-top: 10px;">G 09 G 3/36, G 09 F 9/35, G 06 F 15/21</p>								
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; margin-top: 10px;">Minimum Documentation Searched 7</div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 25%;">Classification System</th> <th style="width: 75%;">Classification Symbols</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">IPC 4 US C1</td> <td style="vertical-align: top;">G 06 F 15/21, /22, /24; G 09 G 3/36; G 09 F 9/35 <u>350:160LC</u>, 330-349; <u>364:401</u>, 402, 403, 406; <u>340:780-785</u></td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched 8</div> <p style="text-align: center; margin-top: 20px;">SE, NO, DK, FI classes as above</p>			Classification System	Classification Symbols	IPC 4 US C1	G 06 F 15/21, /22, /24; G 09 G 3/36; G 09 F 9/35 <u>350:160LC</u> , 330-349; <u>364:401</u> , 402, 403, 406; <u>340:780-785</u>		
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<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT 9</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Category 10</th> <th style="width: 60%;">Citation of Document, 11 with indication, where appropriate, of the relevant passages 12</th> <th style="width: 30%;">Relevant to Claim No. 13</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top; height: 300px;">A</td> <td style="vertical-align: top;">Supermarket, NO 7-8/84, page 25</td> <td></td> </tr> </tbody> </table>			Category 10	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13	A	Supermarket, NO 7-8/84, page 25	
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A	Supermarket, NO 7-8/84, page 25							
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>* Special categories of cited documents: 10</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div>								
<b>IV. CERTIFICATION</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">           Date of the Actual Completion of the International Search  <p style="text-align: center;">1985-12-11</p> </td> <td style="width: 50%; padding: 5px;">           Date of Mailing of this International Search Report  <p style="text-align: center;">1985-12-12</p> </td> </tr> <tr> <td style="width: 50%; padding: 5px;">           International Searching Authority  <p style="text-align: center;">Swedish Patent Office</p> </td> <td style="width: 50%; padding: 5px;">           Signature of Authorized Officer  <div style="text-align: center;">               Jan Silfverling           </div> </td> </tr> </table>			Date of the Actual Completion of the International Search <p style="text-align: center;">1985-12-11</p>	Date of Mailing of this International Search Report <p style="text-align: center;">1985-12-12</p>	International Searching Authority <p style="text-align: center;">Swedish Patent Office</p>	Signature of Authorized Officer <div style="text-align: center;">               Jan Silfverling           </div>		
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